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## **Center Staff Briefing on the Center Director Discretionary Funding Project**

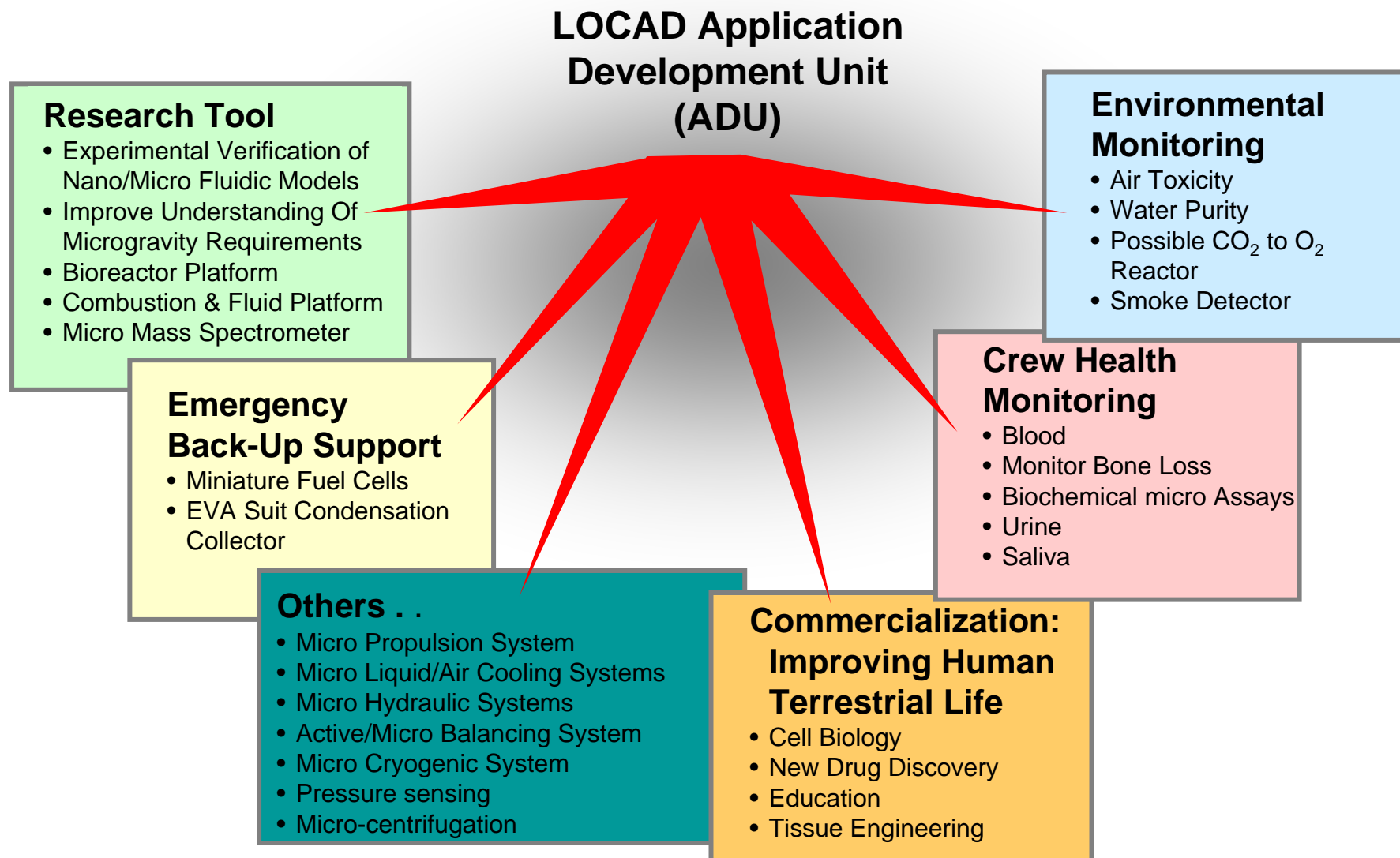
# **Development of an Imbedded Microvalve for Isolation of Reagents and Targets on a Lab-on-a-Chip**

**June 14<sup>th</sup>, 2004**

Dr. Helen Cole, Investigator  
Andy Jenkins, Collaborator



# Potential Mission Critical Applications



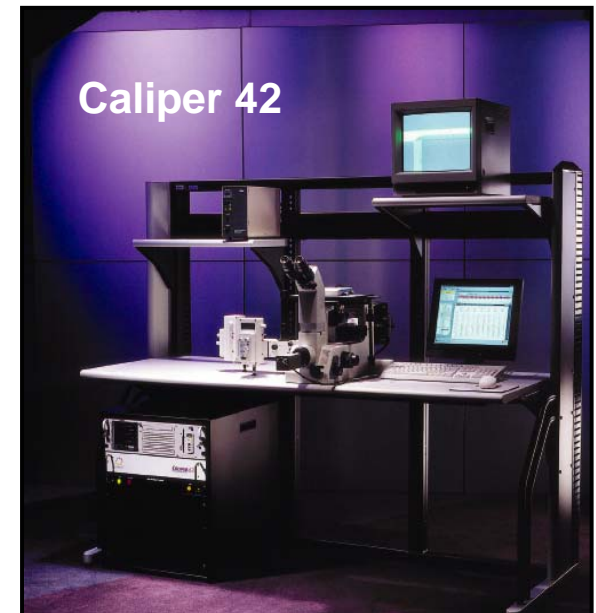


# LOCAD Capabilities



- at MSFC

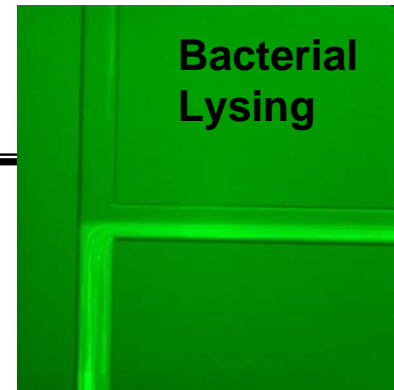
- Caliper 42 unit, a microfluidic chip development workstation
- Lab-on-a-chip set, standard chips (Caliper Life Sciences)
- Application Development Unit - ADU-25 developed at MSFC for chip development
- U.S. Army Missile Command MEMS & Microfabrication Facility



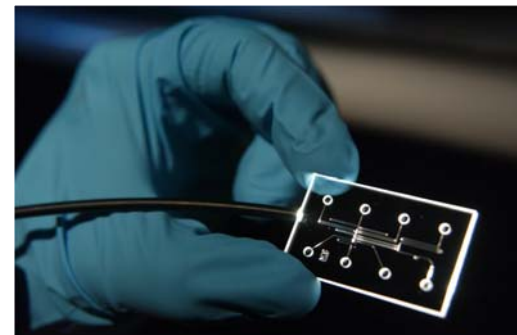


# LOCAD Capabilities

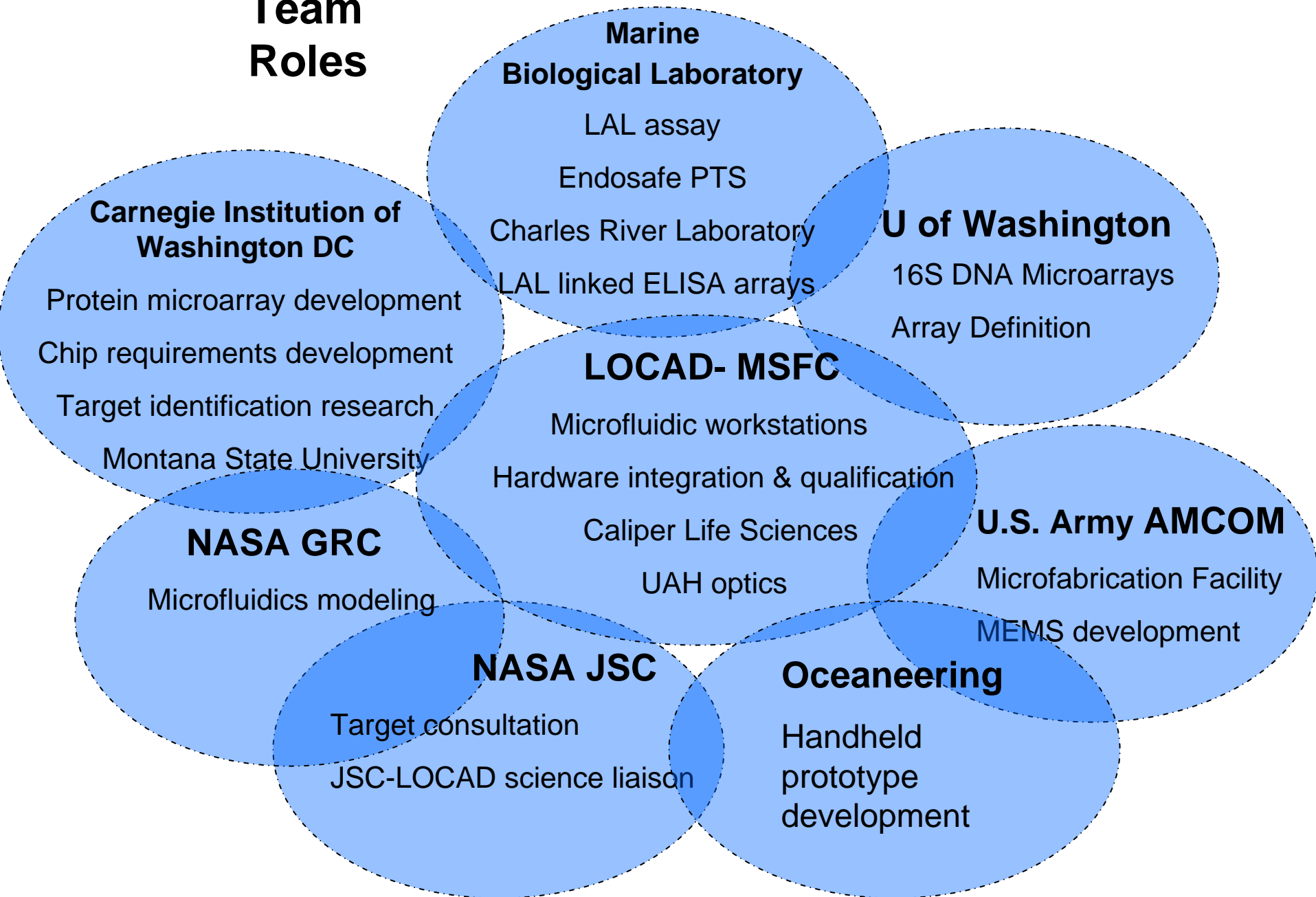
## - Impact to Exploration



- Enabling technology that provides low mass, power, and volume (e.g., handheld) bioanalytical and environmental instrumentation for Exploration.
- Enables development of integrated-function chip products in
  - Environmental Monitoring and Control
    - Handheld Monitoring Units & Chips  
(Water Quality, Air Quality, Microbial Monitoring of water, air, surfaces and food)
  - Medical Systems
    - Handheld Bio Fluid Monitor & Chips  
(blood, urine, saliva, sweat, tears analysis)
  - Search for Life
    - Life Detection on Mars (MASSE Project)
    - Planetary Protection/Microbial Detection



# Team Roles





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## LOCAD Collaborators

### Individual

Andrew Steele

Norm Wainwright

Mark Ott

Duane Pierson

Jeff Allen

Paul Ashley  
development

David Stahl

Jud Hedgecock

### Organization

Carnegie Institute

Marine Biological Laboratory

Johnson Space Center

Johnson Space Center

Glen Research Center

U.S. Army (AMCOM)

University of Washington

Oceaneering

### Activity

Search for life on Mars

Microbial detection

Astronaut health

Astronaut health

Two phase flow studies

Chip fabrication

DNA microarrays

Handheld unit



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## **Development of an imbedded Microvalve for Isolation of reagents and targets on a Lab-On-a-Chip**

- Why do we need this?
  - Reagent & processed fluid separation
- What does Caliper use?
  - No valves
- Why can't we get it elsewhere?
  - The valves/system need to be integrated
- What is the criticality?
  - Essential for space flight





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## Other Activities Leveraging LOCAD In-guide Content

- Human Support Technology, Environmental Monitoring & Control HRI proposal for LOC automated/embedded ECLSS monitoring from LOCAD/collaboration team
- Search for Life (Collaboration with Modular Assay for Solar System Exploration (MASSE), Code S/Carnegie Institution of Washington D.C.)
- Planetary Protection (Collaboration with Marine Biological Laboratory/ Code S ASTID)
- Autonomous Medical Care HRI proposal for development of Handheld Bio Fluid Monitor using protein/antibody, DNA, RNA microarrays from LOCAD/Collaboration team
- Behavioral Health and Performance HRI proposal using LOC measurement of melatonin and other markers in collaboration with JSC
- Human Health Research Technology HRI proposal for flow cytometry sample preparation in collaboration with JSC
- Life in Moon/Mars and Deep Space Environments HRI proposal from LOCAD/collaboration team in conjunction with ARC